Qualitative Code Book for Foster's Nonlinear Model of Information Behaviour

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Appendix: An evolving codebook for Foster's nonlinear model v2.

Codes for core process Opening

Main Code	*Sub Code*	*Description of Codes*	*Notes*
Opening		A core process composed of multiple individual behaviour patterns. Opening corresponds to the processes of seeking, exploring and revealing information. In simple terms, these are actions or active events. Activity belonging to the components to be nested within the core process.	
Chaining		Composed of three sub-codes relating to different aspects, Backward Chaining, Forward Chaining and Source Chaining	
	Backward Chaining	Highlights a pattern of behaviour for increasing the scope of their searching and information available to them.	Examples include the use of references, footnotes and bibliographies within items either already known to them, recommended to them, tangential to the area of interest or in the broad area.
	Forward Chaining	Forward Chaining, or Citation Searching as it is also known, was perceived to be a much more focused and difficult activity.	Forward chaining involved two sub-processes: first identifying an author or paper of interest, and second, finding work that cited the original author or paper.
	Source Chaining	For example an advertisement for a book could begin a chain of information seeking, reading and Opening far beyond the initial stimuli (an advert and a book).	Chained from newspaper clippings to journals and books, stimulated by leads in the original texts where a book led off a whole new area of investigation inspiring networking, and further reading for the respondent.

Main Code	*Sub Code*	*Description of Codes*	*Notes*
Monitoring		Identifiable as an activity of keeping track, watching for change or new items, and involved revisiting the same information source over a period of time.	Visiting a source once is excluded from definition as Monitoring, the key is revisiting.
Eclecticism		A strategy for gathering information over time.	Encompassed accepting, gathering and storing information from a diverse range of both passive and active sources, sometimes over considerable time periods, for later incorporation and satisfaction of information needs
Keyword searching		Use of keywords to search an information source.	
Networking		Networking was a pattern of communication by information seekers via various media and with varying degrees of formality and structure to obtain information from other human contacts.	Networking was defined chiefly as talking [or otherwise interacting] with somebody. Networking was an interaction, not a one way process. Often noted as using friends, colleagues, or someone with whom contact had occurred previously. Often appears alongside descriptions of information received.
Serendipity		Four sub-codes are identified that collectively contribute to the "serendipity" code.	Coded for brevity as Types A2, A3, B2 and B3. The four sub-categories for serendipity are defined as follows:
	Serendipity type A2	Type A2 Serendipity derived from the most restrictive framework where both object and location are conceived to some degree prior to occurrence of Serendipity. In this form the event borders with traditional searching.	Example an interviewee had previously defined a research topic and was actively seeking sources of information on it and had independently identified a radio programme giving the type of information that might contain suitable material. Experience of Serendipity in this narrow form is close to the experience of Searching for a defined object and should merely be indicative of Serendipity arising in the course of normal Information Searching activities.

Main Code	*Sub Code*	*Description of Codes*	*Notes*
	Serendipity type A3	Serendipity defined in the context of searching or knowing something of the subject area with sufficient detail to know that a gap with certain attributes existed. ‘	‘Normal searching’ would tend not to locate the items and possible sources and locations were unknown and remained undefined. In this interviewees describe an anticipation of what they would find, if they could find it.
			Both of the first two types of Serendipity, A2 and A3, highlight aspects of recognising the relevance of information with a defined object, if not a defined location for obtaining it.
			In interviewees with this pattern prior experience of information sources appeared higher.
	Serendipity type B2	In type B2, Serendipity was identified in interviewee descriptions as arising where specific items were undefined, unknowable, unspecified, and yet potential information sources to hold answers were identified.	*However, both A2 and A3 were less common in interviewees than Serendipity types B2 and B3. The difference was perceived by interviewees took the form of less prior expectation of what information gaps might exist.*
	Serendipity type B3	The experience of interviewees most commonly reflected a situation in which a low level of knowledge, low level of problem definition, and low knowledge about potential information sources for an area combined to present an information need that was either unrecognised or partially recognised.	Open browsing, is identified as activity oriented around viewing of information without a positive focus or guide as to direction, and this is now specified as having two variants.

Main Code	*Sub Code*	*Description of Codes*	*Notes*
Browsing		Browsing defined as Open and Selective.	
	O2-Open	Poorly defined browsing (browse, graze, navigate, scan, glimpsing, examining);	
	O3- Open	Undefined (encounter, serendipity, glimpsing)	A second form of browsing, identified as Selective, implies a greater certainty about the routes that might possibly be used to find information.
	S2-Selective	S2 is well defined formal search and retrieval browsing of results	
	S3-Selective	Semi-defined (browse/forage/scan);	Tendency for this to be recognised as "a conscious and deliberate expansion of searching to allow exploration of every possibility" and was coded within the core process of 'opening'. As a deliberate, conscious expansion of information horizons it was associated with starting wider so that narrowing could produce results. In this it was acknowledged to be a complex composite of multiple sub-actions, and specifically source selection, keyword identification, sifting and refining.
Breadth Exploration		Information seeker consciously widens the scope of their information seeking.	e.g. deliberately choosing wider keywords or a more general search source.

Codes for core process Orientation			
Main Code	***Sub Code***	***Description of Codes***	***Notes***
<u>Orientation</u>		Orientation processes were defined as encompassing a diverse range of activities covering the identification of existing research, key themes, disciplinary communities, latest opinion, sources, keywords, and picture building.	In Foster's (2003) work, Orientation was identifiable in an analogy to stacking boxes - "deciding upon where the box was, deciding what the box was, and which way up the box was supposed to be". Hence Orientation – which way is up.
Identify Keywords		The process of determining appropriate keywords to represent the topic of interest.	
Picture building		The way information seekers created an overview of a subject and constructed their "understanding" of what a subject was about: particularly its composition from sources, information, and questions.	In coding this, some interesting lines of inquiry include obtaining examples of the diagrams, sketches and mind maps interviewees produce for further analysis.
Identifying the Shape of Existing Research:		The shape or form of existing research and meaning in that what constitutes research, data, methods, perspectives were suggested to be as important as other elements of Picture Building.	As an information seeker gets to know the information domain of the search Identifying the Shape highlights key features of the exploration.
	Identifying Disciplinary Communities	Identify the disciplines or domains holding relevant information.	
	Identifying Key Names	Identify key contributors to a field of interest	
	Identifying Key Articles	Identify the key information items and structures of the field	

Main Code	*Sub Code*	*Description of Codes*	*Notes*
	Identifying Latest Opinion in Disciplines	Identify recent items within the field of interest	
Defining a problem		Descriptions involving the creation of questions, structure and boundary around an area of interest.	To identify elements of the process of defining an information problem. The conclusion of which is the first part of a defined problem, which can evolve throughout information seeking.
Source Identifying		Activity involved in identifying potentially useful sources of information.	
Source Selection Decisions		The process of deciding which potential information sources match need, requirements for quality, and are attainable given the opportunities and limitations derived from contextual dimensions e.g. accessibility.	

Codes for core process Consolidation			
Main Code	***Sub Code***	***Description of Codes***	***Notes***
<u>Consolidation</u>		A process of jreflecting, judging, integrating, and deciding whether further information seeking was necessary was confirmed across the original, and new data sets	
Knowing enough		Questioning whether sufficient material to meet the present information need had been acquired	
Refining		Activity deciding which search boundaries are appropriate and narrowing the search focus and is distinct from sifting as refining moves from using to creating relevance criteria	The generation of boundaries implies the generation of relevance criteria which were highlighted in some depth in Foster (2003). Relevance criteria may be implied, may be explicit, and may change much throughout information seeking.
Sifting		Relied upon an information seeker considering the available information and applying a relevance judgment to it.	Relevance judgements are of interest as they are the *use* of relevance criteria.
Reviewing		Patterns of reviewing their existing information and the relationship of this to current information problems. Two contributory elements (a) intellectual and (b) physical.	a) Definition reviewing in the "intellectual" form, Reviewing was identified as an entirely non-physical mental process and considered what was already known. (b) Definition reviewing also had a physical parallel in the construction of information organisation e.g. generation of bibliographies from previously collected material and personal collections, for others. the idea of drawing out the ideas, questions and pieces of information provided a similar effect.

Main Code	*Sub Code*	*Description of Codes*	*Notes*
Incorporation		The incorporation of material into their understanding as "taking on board", "trying to tie them all in", "bringing it together". The process of linking and relating new material to existing knowledge and information.	
Finishing		Included final information seeking to update earlier searches and to ensure a measure of completeness was achieved.	Material to be coded as Finishing focuses on final/ending activities. .Indicated by information seekers description.
Verifying		Checking the accuracy and completeness of information.	

Codes for core process Intrinsic Context

Main Code	*Sub Code*	*Description of Codes*	*Notes*
Intrinsic Context		A group of codes focussing on the learning, personality, motivation, knowledge and affective aspects of the information seeker as an individual.	The scales are indicative at present and require further concentrated empirical study to bring them fully within the model.
Personality and learning	**Personality Traits, the work of** Norman (1963) offers a starting point.	Several scale dimensions include **extroversion**, **agreeableness**, **conscientiousness**, **neuroticism**, and **openness to experience**.	In assessing the optimum ways to measure these attributes it seems likely that multiple measurement drawing on those above would be beneficial in developing the Foster model.
	Openness as described in Foster (2004) relates to openness to experience.	Openness to experience has scales for intellectual versus unreflective, narrow and imaginative versus simple, direct.	
	Conscientiousness and openness are useful in helping in classify differences in individuals' information seeking behaviour.	Conscientiousness offers a scale (persevering to quitting/fickle.	

Main Code	*Sub Code*	*Description of Codes*	*Notes*
	Learning Styles	There are several categorisations of learning style that relate to learning through reading (Urquhart & Weir, 1998, p.99): holistic versus serialist (Pask, 1976); deep processors versus surface processors (Marton & Säljo, 1976); logocentric versus resistant (Hartman, 1992) and dominant versus submissive (Widdowson, 1984). The code term 'Holistic' (Foster, 2004) can be related readily to holistic learning styles. Though holistic is merely one of several variations.	Similarities between the holistic processors and deep processors and between resistant and dominant approaches are possible. e.g. Heinstrom's (2005) three student searching styles integrating aspects of different cognitive approaches (learning styles) with personality traits fit the data: Fast surfing is related to a surface study approach that has low openness to experience. Broad scanning was linked to openness, extraversion and competitiveness. Deep diving is characteristic of an analytic approach, with deep or strategic approaches to learning.
Knowledge		What does the information seeker know already? Knowledge state is the result of a process of establishing a scheme that makes sense of various pieces of information can be new or existing (previous knowledge).	Information seeking relies upon new and existing background knowledge to structure and make coherent sense of a search topic and search results.
			Learning from linguistics previous knowledge helps develop (as noted in Picture Building) and also maintain coherence in handling unfamiliar material and aids the application or development of a suitable schema, a macrostructure or framework for holding the pieces together. If the reader is searching then background knowledge helps in forming a provisional macrostructure (Urquhart & Weir, 1998, p.252). Knowledge within the datasets contributes heavily to 'Picture building' and 'Reviewing' exactly as a framework or scaffolding to support coherence, organisation and understanding of a topic

Main Code	*Sub Code*	*Description of Codes*	*Notes*
Affect		Affective elements, feelings and emotion, were confirmed as having an impact upon the willingness to undertake certain tasks and the type of outcome obtained.	
	Flexibility in interpretation of information, and information sources	The literature supports the view that the more positive the affect the likelier it is that people are to undertake tasks and are able to categorise material more flexibly (Isen, Daubman, & Nowicki, 1987; Estrada, Isen & Young, 1997; Isen 2009).	
	Nomadic thought, an approach to a topic that permits exploration and challenge	Identified as having either positive or negative effect. If we relate cognition to affect, it is possible to consider successful 'Nomadic Thought' as originally identified in Foster (2003; 2004) as the result of a particular learning style (logocentric or submissive) allied to positive affect.	The concepts of positive or negative affect, and schema theory or the subcase of schema of scripts (characteristic sequence of events in a particular setting) are also of potential interest in measuring these aspects (Bartlett, 1932; Schank & Abelsen, 1977).
	Self Efficacy	An indication of confidence in their ability to undertake an information seeking task.	Varying from highly confident, to not confident at all.
	Uncertainty	Adopting Kuhlthau's (1993) proposed definition of uncertainty as a basic principle for information seeking.	Defining uncertainty as: a cognitive state which commonly causes affective symptoms of anxiety and lack of confidence.
	Perception of topic complexity	Perception of topic as complex, challenging, simple.	

Main Code	*Sub Code*	*Description of Codes*	*Notes*
Motivation	Identify why was an action or behaviour undertaken.	**Following** Fransson (1977; 1984) motivation, learning approach, and outcomes with regard to reading have a parallel application in information seeking.	Fransson found students who were motivated by expected test demands to read a text for which they have little interest (**extrinsic motivation**) were likely to adopt a surface learning strategy. Students motivated by the relevance of the content of the text to their personal needs and interests (**intrinsic motivation**) adopt a deep level learning approach.

Codes for core process Extrinsic Context

Main Code	*Sub Code*	*Description of Codes*	*Notes*
Extrinsic Context		Extrinsic context that an information seeker finds themselves within and highlights that information behaviour is not isolated from the context within which the information seeker works.	
Social environment		The environment in which information seeking and information sharing took place, encapsulating availability of supportive or non-supportive social interactions.	Social Environment opportunities for networking and interaction were stressed in the earlier study of interdisciplinary researchers and confirmed for the JUSTEIS dataset. Reliance on goodwill and informal sharing was on par with good formal resources in the perception of participants.
Time		Major variants observed across the datasets were simple well defined tasks versus open ended longer tasks, and how much time was available for the task.	
Project		Is the project a formal task or a casual task? Is the project simple or complex? Is the project a single focal point of activity or part of a more complex series of tasks?	

Main Code	*Sub Code*	*Description of Codes*	*Notes*
Navigation Issues and Access to Sources		Refers specifically to the organisation of information, and to the problems incurred by information seekers as they move from familiar territory towards new information environments.	Access was both Physical Access Resource bound and made a substantial contribution to Source Selection Decisions and the Context of Source Selection. Two sub-codes span Navigation and Access to Sources:
	Physical Access	Defined by interviewees as being able to look at, and use, a Source, in this sense it is very much a matter of geographical (or virtual) location relative to the information seeker.	
	Resource access	Appeared in a continuum from a source that was available with some exertion of effort locally through to something being entirely inaccessible or unobtainable	For strategies such as Browsing, ease of access was vital to use of Sources. Where material was accessible only with a Resource element of either a time delay or expense then it was judged inaccessible.

The relationship of process, behaviour, cognition and time.

Main Code	*Sub Code*	*Description of Codes*	*Notes*
Timing		Aim of this code is the Identification of Relationships and Order of Behaviour to be coded. Two main approaches to identifying timing are useful: First, in the description of interviewees as they discuss how their different activities occur, typical examples might describe repetition, looping, flipping, and events following each other. The second method of identification assumes an observational stance and analyses descriptions of thoughts, behaviour, and outcome.	The emphasis is upon capturing not just individual events, but considering the event as it relates to other behaviours [at low level code and at higher level core process levels]. This simplified code aims to identify the order of occurrence of behaviour and contextual elements. Not all data allows categorisation by time or relative occurrence, and we observed with students a swift passing through multiple processes rapidly in the JUSTEIS dataset.

General notes:

Coding to highlight top level Core Processes and then lower level component processes allows identification of all processes.
Multiple coding of text to ensure all items identified is important. Important that Behaviour is coded and where one Code overlaps with another e.g. one event might give rise/be influenced by one or more other events.
The code book presented here represents a significant simplification compared to Foster (2003); sub-codes and variations are reduced or combined where possible.
Observations suggest that the Extent and Intensity scale work for the Core Processes, while the adoption of a number of new scales relating to Personality, Learning, and Affective elements is appropriate for Intrinsic Context.